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Revisional Gastric Bypass After Failed Adjustable Gastric Banding—One-Stage or Two-Stage Procedure?

A. Schäfer[1] · Philipp Gehwolf[1] · J. Umlauft[2] · T. Dziodzio[3] · M. Biebl[3] · A. Perathoner[1] · F. Cakar-Beck[1] · H. Wykypiel[1]

Abstract

Background Revisional laparoscopic Roux-en-Y gastric bypass (R-LRYGB) is the preferred procedure after failed adjustable gastric banding. Little is known about whether a one-stage procedure (one surgery for band removal and R-LRYGB) or a two-stage procedure (first band removal and later R-LRYGB) is superior. Aim of this study is to compare early- and long-term results of both methods at our institution.

Methods Retrospective analysis of 165 (m 26/f 139) consecutive patients (98 one-stage, 67 two-stage) with R-LRYGB. Mean follow-up time was 50.1 ± 38.8 months. Indications for one-stage vs. two-stage procedures, operating time, peri- and postoperative complications, morbidity, mortality, and length of stay (LOS) were analyzed. Data are reported as total numbers (%) and mean $\pm$ standard deviation.

Results Mean age at R-LRYGB was 43.9 ± 10.7 vs. 44.3 ± 10.7 years with a BMI of 37.1 ± 6.8 vs. 39.8 ± 7.1 (one-stage vs. two-stage). In the one-stage group, the main indication for revisional surgery was weight regain (57.1%), followed by dilatation of the esophagus or pouch (37.7%) and gastroesophageal reflux disease (GERD) (36.7%), whereas in the two-stage group, it was band erosion (52.2%) and dilatation of the esophagus or pouch (17.9%) and GERD (11.9%). There was no significant difference in operative time (208.5 ± 61.2 vs. 206.3 ± 73.5 min), LOS (8.6 ± 3.4 vs. 9.3 ± 5.7 days) or mortality (0% overall). Major complications (Clavien-Dindo $\geq$ IIIa) occurred similarly often in both groups: 15.3% vs. 16.9% (one-stage vs. two-stage).

Conclusion Both approaches achieve good results. However, the one-stage R-LRYGB is the preferable procedure because it reduces costs and LOS by doing without an additional surgical procedure.

Keywords Revisional · Gastric bypass · Gastric banding · One-stage · Two-stage

Introduction/Purpose

Laparoscopic adjustable gastric banding (LAGB) is a popular bariatric surgery because of its short operating time, reversibility, and the ability to adapt to the patient's needs. Nevertheless, long-term follow-up studies (> 7 years) have shown band dysfunction (insufficient weight loss) and a high rate of band-related complications (esophagitis, band erosion, leakage, and band slippage) in around 50% of patients. Between 32 and 53% of the patients require surgical removal of the band within the first 7 years [1–4].

It has been advocated that revisional laparoscopic Roux-en-Y gastric bypass (R-LRYGB) is a suitable and effective treatment option in patients after failed LAGB [5–13].

Good results have been demonstrated in both one-stage procedures (band removal, R-LRYGB in one procedure) and in the two-stage procedure (band removal as first procedure followed by R-LRYGB as second procedure) [6, 12, 14–16] with an acceptable major complication rate of 0–23%. However, whether a one-stage procedure or a two-stage procedure is preferable is still the subject of discussion. To date, there is a lack of evidence to show which procedure is superior.

The aim of this study is to demonstrate our experiences with R-LRYGB by comparing peri- and postoperative data between the two procedures.

✉ Philipp Gehwolf
philipp.gehwolf@i-med.ac.at

1 Department of Visceral, Transplant and Thoracic Surgery, Center of Operative Medicine, Medical University of Innsbruck, Anichstrasse 35, 6020 Innsbruck, Austria

2 Department of Dermatology, Venereology and Allergology, Medical University of Innsbruck, Innsbruck, Austria

3 Department of Surgery, Charité-Universitätsmedizin, Berlin, Germany

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Materials and Methods

In this retrospective study of prospectively collected data, patients who underwent R-LRYGB surgery after LAGB failure at the Department of Visceral, Transplant, and Thoracic Surgery, Medical University of Innsbruck, between 2005 and 2016 were analyzed.

Data included demographic and medical aspects such as age, sex, weight, comorbidities, excess body weight (%, EBW), excess body weight loss (%, EBWL), body mass index (kg/m^2, BMI), indication for revisional surgery, operating time, peri- and postoperative complications, mortality, and LOS in R-LRYGB surgery. In two-stage procedures, the data set was not fully reproducible because a large proportion of these patients could not be identified in our documentation system. Moreover, in some of them, the band had been removed in an external clinic. Therefore, we analyzed the indications for band removal only in this subset of patients. Data were defined as total numbers (%), mean and standard deviation. P values were calculated with the chi-square test or Fisher's exact test. A P value < 0.05 was considered significant. Complications were classified after Clavien-Dindo [17]: major complications were defined as complications requiring surgical, endoscopic, or radiological intervention, corresponding to Clavien-Dindo ≥ IIIa. Late complications were those appearing more than 30 days after operation.

The preoperative examination was performed according to the International Federation for Surgery of Obesity and Metabolic Disorders (IFSO) [18] recommendations including a complete blood test with metabolic parameters and endocrinologic examination, a nutrition consultation [19], a psychological consultation as well as an esophagogastroduodenoscopy (EGD) with biopsies. In the case of a Helicobacter pylori infection, eradication was performed. Moreover, it was our policy to measure esophageal motility with either water-perfused stationary pull-up or high-resolution lower esophageal sphincter manometry [20]. If the patient did not tolerate the gastric probe, a radiological upper gastrointestinal series was performed instead. Findings in manometry mainly influenced the decision whether R-LRYGB or a revisional gastric sleeve resection would be performed: patients with impaired esophageal motility (more than 20% defective propagation waves) were excluded from revisional gastric sleeve resection.

The indication whether to perform a one- or a two-stage procedure is not standardized with one exception: in all patients with band erosion, a two-stage procedure was performed. In these cases, the band was primarily removed by endoscopy using the technique of Weiss et al. [21] and R-LRYGB was performed later [6].

In two-stage procedures, the interval between band removal and R-LRYGB was set at approximately 3 to 6 months to guarantee favorable tissue conditions. Since some patients desired simple band removal and wanted to maintain or lose weight on their own, the intervals to R-LRYGB varied strongly. Hence, in this study, we had no consistent interval in two-stage procedures.

The operations were performed by a specialized team of bariatric surgeons under general anesthesia in lithotomy (French) and anti-Trendelenburg position, with a four- or five-trocar technique.

In those patients with an LAGB still in place, the tube between port and band was cut close to the abdominal wall. Then, the band was freed of adhesions and removed.

In all cases, the anatomic changes due to the band were meticulously reversed in order to obtain a quite "normal" anatomy of the stomach. The entire capsule and band channel were removed and adhesions of the fundus to the left crus were dissected. Subsequently, a Roux-en-Y gastric bypass with a short pouch was created with a circular-stapled gastrojejunostomy (CEEA 25 mm Covidien Inc., Intl.), producing a biliary limb length of 100 cm and an alimentary limb length of 150 cm. The jejunojejunostomy was created with a 60-mm longitudinal stapler and by closing the insertion site with a hand-sewn running suture. After 2009, the jejunojejunal mesenteric gap as well as Peterson's space was consistently closed with non-absorbable running sutures.

Postoperative management included intensive care if necessary. Upper GI series with water-soluble contrast media was performed routinely on postoperative day 2. All patients received a nutritional consultation before discharge. Patients were scheduled for follow-up examination at 6 weeks postoperatively, then 3 months, 6 months, 1 year, and annually. Moreover, 3 months after discharge, a metabolic consultation was scheduled.

Results

Altogether, 165 patients were included (f = 139, m = 26), 58.7% received a one-stage R-LRYGB and 41.3% a two-stage R-LRYGB. Five patients needed conversion from laparoscopic to open R-RYGB. Reasons for conversion were massive adhesions in three cases (one patient in one-stage procedure, two in the two-stage procedure). Two intraoperative complications forced conversion. In one case, it was uncontrollable arterial bleeding from the stomach stapler line due to stapler failure (one-stage procedure). In the other case, it was a spleen injury with consecutive conventional splenectomy (one-stage procedure). Laparoscopically manageable minor intraoperative complications were not registered in our database.

All preoperative and demographic patient data are depicted in Table 1.

Results are presented as one-stage vs. two-stage: mean age at R-LRYGB was 43.9 ± 10.7 vs. 44.3 ± 10.7 years (t = 0.23). There was no significant difference in preoperative BMI

Table 1 Demographic data: one-stage vs. two-stage gastric band removal followed by Roux-en-Y gastric bypass

	One-stage	Two-stage
Number	98 (59.4%)	67 (40.6%)
Male	20 (12.1%)	6 (3.6%)
Female	78 (47.3%)	61 (37.0%)
Age (years)	43.9 ± 10.7	44.3 ± 10.7
Body mass index (BMI, kg/m^2)	37.1 ± 6.8	39.8 ± 7.1
Excessive body weight (EBW, kg)	46.8 ± 19.6	53,9 ± 19.6
LAGB to R-LRYGB (months)	98.3 ± 46.3	91.5 ± 46.0
LAGB to band removal (months)	–	67.7 ± 44.6
Band removal to R-LRYGB (months)	–	23.9 ± 33.3
Follow-up (months)	47.1 ± 37.4	54.6 ± 40.6

between the two groups (37.1 ± 6.8 vs. 39.8 ± 7.1, $P = 0.22$), but the preoperative excess weight was significantly higher in the two-stage group (46.8 ± 19.6 kg vs. 53.9 ± 19.6 kg, $P = 0.018$). Mean time from implantation of the band to R-LRYGB was 98.3 ± 46.3 months in the one-stage group and 91.5 ± 46.0 months in the two-stage group. In two-stage approaches, mean time from removal of LAGB to R-LRYGB was 23.9 ± 33.3 months with a large range (median 8 months, minimum 2 months, maximum 171 months). Mean follow-up time was 50.1 ± 38.8 months with a slightly longer follow-up time in the two-stage group (47.1 ± 37.4 months vs. 54.6 ± 40.6 months). With regard to follow-up, 146 (88.5%) patients presented after 1 year, 109 (66.1%) after 3 years, and 89 (53.9%) after 5 years. One patient died during follow-up from a cholangiocellular carcinoma.

Indications for R-LRYGB as well as indications for band removal were different in both groups and are depicted in Table 2. In the one-stage group, main reasons were weight regain (57.1%), dilatation of the esophagus or pouch (37.7%), and GERD (36.7%). In the two-stage group, main reasons for band removal were band erosion (52.2%),

followed by dilatation of the esophagus or pouch (17.9%), and GERD (11.9%). The indication for R-LRYGB surgery was not always given at the time of band removal, since patients wanted to maintain or lose weight on their own. When a simple band removal had been performed previously, the main indication for R-LRYGB was weight regain (95%): patients had a weight regain of 17.2 ± 16.8 kg, i.e., a BMI increase of 6.0 ± 6.0 kg/m^2. The extent of weight regain in two-stage procedures increased with the length of the time interval to R-LRYGB: the longer the time interval to R-LRYGB was, the higher the weight regain was observed, which could even reach pre-band weight. Moreover, in cases where patients did not lose any weight despite implantation of the band (if the band was not tolerated and only implanted for a few days/weeks or became dysfunctional), the weight regain after band removal was very low. One patient, who had the band implanted for only 2 days because of massive dysphagia, even lost weight. Around 18% of the patients with weight regain in the two-stage group suffered additionally from persistent GERD, esophagus motility disorder, or dilatation of the esophagus or pouch.

Duration of revisional surgery was similar in both groups (208.5 ± 61.2 min vs. 206.2 ± 73.5 min) without any statistical difference ($t = 0.22$, $P = 0.41$). LOS was similar in both groups (8.6 ± 4.0 vs. 9.3 ± 5.7 days, $P = 0.19$) for R-LRYGB surgery only.

On follow-up examination, the two groups showed no significant difference in patients' maximum EBWL or final BMI ($36.9 \pm 45.7\%$ vs. $40.7 \pm 32.7\%$, $P = 0.28$ and 30.9 ± 5.75 vs. 31.5 ± 6.5, $P = 0.4$) after 47.1 ± 37.4 months vs. 54.6 ± 40.6 months.

Major postoperative complications (Clavien-Dindo ≥ IIIa) occurred in 25 (15.2%) patients, 15 (15.3%) of whom were in the one-stage group and ten (14.9%) in the two-stage group. All early and late major complications are depicted in Table 3.

Between the two groups, there was no significant difference in overall major complications ($P = 0.95$), early major

Table 2 Indication for revisional laparoscopic Roux-en-Y gastric bypass (R-LRYGB). One-stage vs. two-stage procedures. The indications for simple band removal are provided for comparison. P value refers to indication for R-LRYGB in one-stage vs. two-stage procedure

	One-stage	Two-stage		P value
	Band removal + R-LRYGB	Band removal	R-LRYGB	
Erosion of the band	–	35 (52.2%)	–	–
Weight regain	56 (57.1%)	0 (0.0%)	64 (95.0%)	< 0.01
Dilatation of esophagus/pouch	37 (37.7%)	12 (17.9%)	2 (3.0%)	< 0.01
GERD	36 (36.7%)	8 (11.9%)	8 (11.9%)	< 0.01
Esophagus motility disorder	8 (8.2%)	6 (9.2%)	6 (9.2%)	0.86
Band slippage	7 (7.2%)	2 (3.0%)	–	–
Infection of band/port	1 (1.0%)	6 (9.2%)	–	–
Band leakage	2 (2.0%)	0 (0.0%)	–	–
Fistula between pouch and corpus	1 (1.0%)	0 (0.0%)	–	–

Table 3 Early and late major complications after one-stage vs. two-stage gastric band removal followed by Roux-en-Y gastric bypass

	One-stage	Two-stage	Total	P value
Early complications (< 30 days)	5 (5.1%)	7 (10.4%)	2 (7.2%)	0.19
Anastomotic bleeding	0 (0.0%)	1 (1.5%)	1 (0.6%)	
Intraabdominal bleeding	3 (3.1%)	2 (3.0%)	5 (3.0%)	
Anastomotic insufficiency	2 (2.0%)	3 (4.5%)	5 (3.0%)	
Perforation of small bowel	0 (0.0%)	1 (1.5%)	1 (0.6%)	
Late complications (> 30 days)	10 (10.2%)	3 (4.5%)	13 (7.9%)	1.8
Internal hernia	5 (5.1%)	0 (0.0%)	5 (3.0%)	
Anastomotic stenosis	4 (4.1%)	3 (4.5%)	7 (4.2%)	
Invagination	1 (1.0%)	0 (0.0%)	1 (0.6%)	
Total	15 (15.3%)	10 (14.9%)	25 (15.2%)	0.95

complications ($P = 0.19$), or late major complications ($P = 1.8$). Overall complication rate including minor complications such as wound infection, wound hematoma, and anastomotic ulceration was slightly higher in the two-stage group (44.9% vs. 47.8%), showing no significant difference ($P = 0.75$).

If one excluded all patients with band erosion ($n = 35$) from the two-stage group (32 patients left), mean age at R-LRYGB was 43.9 ± 10.7 vs. 42.9 ± 12.3 years ($t = 0.46$, $P = 0.32$, one-stage vs. two-stage). Preoperative BMI and preoperative excess weight was still significantly higher in the two-stage group (37.1 ± 6.8 vs. 40.7 ± 7.1, $P = 0.01$ and 46.8 ± 19.6 kg vs. 56.4 ± 21.6 kg, $P = 0.01$). Still, there was no significant difference in operation time (208.5 ± 61.2 min vs. 210.2 ± 68.5 min, $t = 0.13$, $P = 0.45$), LOS (8.7 ± 4.0 vs. 9.3 ± 5.7 days, $t = 0.03$, $P = 0.49$), patients' maximum EBWL or final BMI (36.9 ± 45.7% vs. 36.2 ± 40.1%, $P = 0.42$ and 30.9 ± 5.75 vs. 32.3 ± 7.9, $P = 0.13$), and early ($P = 0.3$), late (0.051), or overall ($P = 0.053$) major complications.

We observed a reduction in the overall complication rate (i.e., major and minor complications together) over time: between June 2002 and July 2008 (first third of patients), complications occurred in 65.5% of the patients; between December 2008 and October 2012 (second third of patients) in 35.4%; and between November 2012 and September 2016 (third third of patients) in 27.7%.

Discussion

The purpose of the present study was to investigate whether a one-stage or a two-stage R-LRYGB after failed LAGB is superior, since there is a lack of evidence on this subject. In both groups, we found well comparable results in feasibility, operating time, EBWL, and complication rate, without any significant differences. Our results are consistent with those in the literature showing that R-LRYGB is a safe and feasible method after failed LAGB [5–10].

The strength of our study was the large number of patients in both groups. Moreover, all of our patients received extensive, consistent pre- and postoperative examinations. Full information about our patients was provided thanks to consistent documentation of data and a low migration rate of Austrian patients.

A weakness of our study is the retrospective study design: a randomized prospective trial would be a much better study design for avoiding bias in results and conclusion. Moreover, the data on simple band removal were not always available, because band removal was performed in an external hospital or simply was not documented, as noted above. A matched prospective comparison with sufficient study power would assess the entire data from each circumstance. Furthermore, indications for a one-stage or a two-stage procedure and timing of R-LRYGB after band removal in a two-stage procedure were not standardized.

In this retrospective analysis, we investigated a period of more than 10 years. The only mandatory indication for a two-stage procedure was band erosion. More than half (52.2%) of the patients in the two-stage group suffered from band erosion. In these patients, the band was removed endoscopically, and therefore, the patients were not suitable for a one-stage procedure.

In all other patients, the indication was a matter of the patient's wishes and the attending surgeon's preference. Our policy concerning whether to perform a one-stage or a two-stage R-LRYGB after failed LAGB dramatically changed within the study period. In the early period, simple band removal was performed when a band-related complication (slippage, GERD, dilatation of esophagus or pouch, motility disorder, band leakage) occurred, but the patient had acceptable BMI and no former weight regain with the band in place. Removal was mainly performed without dissecting the band channel or all the adhesions. After simple band removal, patients often tried to maintain their weight or lose weight on their own. Nevertheless, weight regain occurred in around 95% of the patients after simple band removal and was therefore the main indication for R-LRYGB in two-stage procedures. As a result of an increase in evidence and in the technical experience of surgeons, a one-stage procedure is now

intended in all patients except those with band erosion in order to avoid weight regain after simple band removal.

Weight regain due to lack of band efficiency, on the other hand, was the main indication for one-stage procedures (57.1%) for R-LRYGB, as such procedures are a valid and safe treatment option after failed LAGB.

In patients with dilatation of the esophagus or pouch or GERD after LAGB, R-LRYGB seems to be the preferable revisional procedure [22]. As a consequence of the artificial "outflow obstruction" by the band, the lower esophageal sphincter may dilate continuously causing the pouch and the distal esophagus to become a "common vessel." This may lead to permanent exposure of the distal esophagus to refluxed material, causing symptoms and pathophysiology like GERD [23]. This situation needs to be addressed when it comes to revisional surgery: with the R-LRYGB as an antireflux procedure, weight control and prevention of reflux can be achieved in one stage. Motility disorder is a consequence of the abovementioned pathophysiology and therefore only curable with an antireflux operation: all patients with motility disorder (9.2% of all two-stage patients) had persistent symptoms after band removal. Therefore, all those went to R-LRYGB since they obviously needed an antireflux concept. This clearly shows the superiority of one-stage procedures in cases of motility disorder, as noted above. Nevertheless, in our retrospective analysis, the decision to perform a one- or two-stage procedure in cases of motility disorder was mainly influenced by the patients' wishes and symptoms: if they were still obese, a one-stage procedure was performed. If they had achieved sufficient weight loss so far, a two-stage procedure was performed. With regard to band slippage, patients presented with dysphagia. Whether a one- or a two-stage procedure was intended in these cases was mainly influenced by the patient's condition: Acute dysphagia was treated immediately with simple band removal. If the symptoms were rather mild, a one-stage procedure was planned.

Band infection is still the subject of discussion. In the present study, in five out of six patients with band infection, a two-stage procedure was performed. None of the six patients suffered from a postoperative complication due to infection.

The two patients with band leakage presented with gradual weight regain due to band dysfunction. As they were still obese when band dysfunction occurred, a one-stage procedure was performed.

In the patient with a fistula between pouch and gastric corpus, a one-stage procedure was performed in order to revise the fistula intraoperatively.

An advantage of the one-stage procedure is that it requires only one surgery and therefore reduces the cumulative peri- and postoperative risks, costs, operating time, and LOS by eliminating the need for additional surgery. Since band removal and R-LRYGB are mostly performed laparoscopically, the operative abdominal access (creating a pneumoperitoneum) is needed only once. Consequently, intraoperative risks, such as perforation,

bleeding, and adhesions, are reduced. Intraoperatively, the band channel can be used as an anatomic landmark for adhesiolysis and placement of the gastrojejunostomy. Above all, patients with a one-stage procedure were shown to have less excess body weight at time of R-LRYGB as compared to patients with a two-stage procedure, who often experience significant weight regain after band removal.

Surprisingly, operating time was not significantly shorter for R-LRYGB in the two-stage group, although the band had already been removed. In fact, both procedures entailed similar operating times. If the operating time for the previous band removal was also counted, it can be assumed that the total operating time would be significantly longer for the two-stage approach. Taken together, this clearly indicates better technical feasibility of the one-stage procedures based on the remaining band as a landmark.

In both procedures, we had comparable LOS without a significant difference between the groups. It can be assumed that also the overall LOS would be significantly longer in two-stage procedures if LOS for the previous band removal were also counted.

When comparing our results with those in the literature, both procedures are seen to have acceptable operating times, which are naturally longer than for primary LRYGB surgeries [24, 25]. Band channel removal, mobilization of the fundus, and adhesiolysis to recreate the "normal" anatomy are more complex and demanding than in primary LRYGB. Compared to high-volume centers [11, 14, 15, 22], we had longer operating times, as our institution is a teaching hospital with a mixed team of bariatric surgeons having varied experience and training levels.

The same applies for our longer LOS as compared to that in the literature [11, 14, 15, 24], which can also be explained by the Austrian health economics system not having the same pressure to discharge patients early, as compared to other countries.

The present study entailed a major complication rate of 15.2%, which is comparable to the literature, where major complication rates are reported from 0 to 23% [5, 8, 9, 11, 12, 14] in R-LRYGB. Our complication rate is even comparable to that for primary LRGBY: a review of 3464 cases with primary LRYGB reported a major complication rate of 11.7% [25]. This large deviation in major complications in other studies can be explained by a bias in the definition of major complications and a lack of documentation. With time, we observed a reduction in complications due to improvements in operating technique. Especially, internal hernias occurred only in patients who underwent surgery between 2002 and 2009. After 2009, Peterson's space was consistently closed, and so far, no internal hernias have occurred since then. Our experience is consistent with that in the literature, showing that consistent closure of Peterson's pouch and jejunojejunal mesenteric gaps with non-absorbable sutures leads to a significant reduction in internal hernias [26]. The literature describes a higher risk for anastomotic strictures in one-stage

procedures due to fibrosis of the tissue [16]. Nevertheless, our study showed no correlation between the one-stage procedure and an increase in anastomotic complications.

Finally, we believe that a one-stage procedure is preferable in R-LRYGB after failed LAGB. This is also confirmed by study data from high-volume centers where a one-stage procedure is recommended from banding to R-LRYGB [6, 11, 12, 14, 15] in selected patients. However, the indication will always be a matter of the patient's wishes and the surgeon's preference.

Conclusion

Although technically very demanding, R-LRYGB is a highly feasible surgical option for patients after failed LAGB and shows good results. Therefore, we highly recommend a one-stage procedure as standard procedure for conversion of LAGB to R-LRYGB.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Statements Regarding Ethics and Consent The Etics Committee of the Medical University of Innsbruck confirms that for retrospective observational studies no ethics committee approval is required by Austrian law.

References

1. Mittermair RP, Obermüller S, Perathoner A, et al. Results and complications after Swedish adjustable gastric banding-10 years experience. Obes Surg. 2009;18(12):1636–41.
2. Balsiger BM, Ernst D, Giachino D, et al. Prospective evaluation and 7-year follow-up of Swedish adjustable gastric banding in adults with extreme obesity. J Gastrointest Surg. 2007;11(11):1470–7.
3. Lanthaler M, Aigner F, Kinzl J, et al. Long-term results and complications following adjustable gastric banding. Obes Surg. 2010;20(8):1078–85.
4. Gehwolf P, Bodner J, Augustin F, et al. Swedish adjustable gastric banding - an underestimated risk factor for the development of esophageal cancer? Eur Surg. 2011;43(6):387–9.
5. Angrisani L, Vitiello A, Santonicola A, et al. Roux-en-Y gastric bypass versus sleeve gastrectomy as revisional procedures after adjustable gastric band: 5-year outcomes. Obes Surg. 2017;27(6):1430–7.
6. Perathoner A, Zitt M, Lanthaler M, et al. Long-term follow-up evaluation of revisional gastric bypass after failed adjustable gastric banding. Surg Endosc. 2013;27(11):4305–12.
7. Weber M, Müller MK, Michel J-M, et al. Laparoscopic roux-en-Y gastric bypass, but not rebanding, should be proposed as rescue procedure for patients with failed laparoscopic gastric banding. Ann Surg. 2003;238(6):827–33.
8. Mognol P, Chosidow D, Marmuse JP. Laparoscopic conversion of laparoscopic gastric banding to Roux-en-Y gastric bypass: a review of 70 patients. Obes Surg. 2004;14(10):1349–53.
9. Bueter M, Thalheimer A, Wierlemann A, et al. Reoperations after gastric banding: replacement or alternative procedures? Surg Endosc. 2009;23(2):334–40.
10. Robert M, Poncet G, Boulez J, et al. Laparoscopic gastric bypass for failure of adjustable gastric banding: a review of 85 cases. Obes Surg. 2011;21(10):1513–9.
11. Elnahas A, Graybiel K, Farrokhyar F, et al. Revisional surgery after failed laparoscopic adjustable gastric banding: a systematic review. Surg Endosc Other Interv Tech. 2013;27(3):740–5.
12. Dakour Aridi HN, Wehbe M-R, Shamseddine G, et al. Long-term outcomes of Roux-en-Y gastric bypass conversion of failed laparoscopic gastric band. Obes Surg. 2017;27(6):1401–8.
13. Kriwanek S, Loibner N, Partri P, et al. Bariatric surgery for treatment of type 2 diabetes mellitus. Eur Surg. 2016;48(6):361–74.
14. Debergh I, Defoort B, De Visschere M, et al. A one-step conversion from gastric banding to laparoscopic Roux-en-Y gastric bypass is as safe as a two-step conversion: a comparative analysis of 885 patients. Acta Chir Belg. 2016;116(5):271–7.
15. Emous M, Apers J, Hoff C, et al. Conversion of failed laparoscopic adjustable gastric banding to Roux-en-Y gastric bypass is safe as a single-step procedure. Surg Endosc Other Interv Tech. 2015;29(8): 2217–23.
16. Van Nieuwenhove Y, Ceelen W, Van Renterghem K, et al. Conversion from band to bypass in two steps reduces the risk for anastomotic strictures. Obes Surg. 2011;21(4):501–5.
17. Dindo D, Demartines N, Clavien P-A. Classification of surgical complications a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Ann Surg. 2004;240(2):205–13.
18. Khwaja H, Coelho AJ, Mazzarella M, et al. The IFSO website (www.ifso.com): the online gateway to obesity and metabolic disorders for bariatric surgery professionals and patients: on behalf of the IFSO Communications Committee www.ifso.com. Obes Surg. 2015;25(11):2176–9.
19. Anatoniou S, Anastasiadou A, Antoniou G, et al. Preoperative nutritional counseling versus standard care prior to bariatric surgery. Eur Surg. 2017;49(3):113–7.
20. Gehwolf P, Hinder RA, DeVault KR, et al. Significant pressure differences between solid-state and water-perfused systems in lower esophageal sphincter measurement. Surg Endosc. 2015;29:3565–9.
21. Weiss H, Nehoda H, Labeck B, et al. Gastroscopic band removal after intragastric migration of adjustable gastric band: a new minimal invasive technique. Obes Surg. 2000;10:167–70.
22. Lanthaler M, Mittermair R, Erne B, et al. Laparascopic gastric rebanding versus laparoscopic gastric bypass as a rescue operation for patients with pouch dilatation. Obes Surg. 2006;16:484–7.
23. Wykypiel H, Gadenstätter M, Granderath FA, et al. Pathophysiology of gastro-oesophageal reflux disease (GERD) with respect to reflux-induced carcinogenesis. Eur Surg. 2002;34(5):296–302.
24. Nguyen NT, Ho HS, Mayer KL, et al. Laparoscopic Roux-en-Y gastric bypass for morbid obesity. JSLS J Soc Laparoendosc Surg. 1987;3(3):193–6.
25. Podnos YD, Jimenez JC, Wilson SE, et al. Complications after laparoscopic gastric bypass. A Review of 3463 cases. Arch Surg. 2003;138(9):957–61.
26. Champion JK, Williams M. Small bowel obstruction and internal hernias after laparoscopic Roux-en-Y gastric bypass. Obes Surg. 2003;13(4):596–600.